CLAIMS

1. A wireless communication receiver for facilitating a termination of reception of a received signal on a voice channel simultaneously with an end of a transmission on the voice channel, the wireless communication receiver comprising:

a receiver front end for receiving a known Stop Waveform comprising a predetermined symbol pattern on the voice channel, the Stop Waveform sent at the end of the transmission; and

a processor coupled to the receiver front end and programmed to terminate the reception of the voice channel in response to detecting the Stop Waveform,

wherein the processor is further programmed to:

compute a plurality of characteristics derived from the received signal, including:

a carrier-to-noise ratio;

a maximum normalized symbol correlation energy over all symbols of the Stop Waveform; and

a number of small and a number of large normalized symbol energy values; and

detect the Stop Waveform by comparing the plurality of characteristics with a corresponding plurality of predetermined thresholds.

2. The receiver of claim 1,

wherein the Stop Waveform is modulated as an M-ary frequency-shift-keyed (FSK) signal, and

wherein the processor is further programmed to compute the carrier-to-noise ratio by breaking down a waveform correlation between the received signal and the known Stop Waveform into symbol-level correlations, based on the predetermined symbol pattern with expected symbol deviation frequencies, at different timing offsets.

3. The receiver of claim 2, wherein the processor is further programmed to compute the carrier-to-noise ratio by, for each of the different timing offsets, phase-correcting said symbol-level correlations according to a known modulation index and the predetermined symbol pattern, thereby producing a plurality of phase-corrected symbol-level correlation sequences.

4. The receiver of claim 3, wherein the processor is further programmed to compute the carrier-to-noise ratio by, for each timing offset, computing a Fourier transform magnitude-squared of the plurality of phase-corrected symbol-level correlation sequences.

5. The receiver of claim 4, wherein the processor is further programmed to compute the carrier-to-noise ratio by, for each timing offset, performing a frequency search, over a predetermined range, for a maximum energy peak in the Fourier transform, corresponding to the timing offset.

6. The receiver of claim 5, wherein the processor is further programmed to compute the carrier-to-noise ratio by, for each timing offset, computing the carrier power, by summing up the Fourier transform magnitude-squared over multiple bins, centered about a frequency bin where the maximum energy peak has occurred.

7. The receiver of claim 6, wherein the processor is further programmed to compute the carrier-to-noise ratio by determining an optimum timing offset based on a maximum carrier power.

8. The receiver of claim 7, wherein the processor is further programmed to compute the carrier-to-noise ratio by computing a noise power by summing the Fourier transform magnitude-squared, corresponding to the optimum timing offset, over all remaining bins that were not used for computing the carrier power.

9. The receiver of claim 8, wherein the processor is further programmed to compute said maximum normalized symbol correlation energy over all symbols of the Stop Waveform by forming a normalized symbol correlation energy sequence, by taking a magnitude-squared of each of the symbol-level correlations, for each symbol interval, corresponding to said optimum timing offset, and dividing by a received signal power over the same symbol interval, where the denominator term uses a timing offset corresponding to a nominal symbol timing.

10 The receiver of claim 9, wherein the processor is further programmed to compute said number of small and said number of large normalized symbol energy values over all symbols of the Stop Waveform, wherein a normalized symbol correlation energy value is said to be small if it is less than said maximum normalized symbol correlation energy scaled by a first predetermined value that is less than unity, and wherein a normalized symbol correlation energy value is said to be large if it is greater than said maximum normalized symbol correlation energy scaled by a second predetermined value that is less than unity.

11. A wireless communication transmission device for facilitating a termination of reception of a received signal on a voice channel simultaneously with an end of a transmission on the voice channel, the wireless communication transmitter comprising:

a transmitter for transmitting a wireless communication signal; and

a processor coupled to the transmitter for controlling the transmitter,

wherein the processor is programmed to control the transmitter to transmit a predetermined Stop Waveform at the end of the transmission in a plurality of consecutive time slots on a plurality of independent frequency hops.

12. The wireless communication transmission device of claim 11, wherein the processor is further programmed to control the transmitter to modulate the Stop Waveform as an M-ary frequency-shift-keyed (FSK) signal that utilizes only symbol values that are not utilized for transmitting voice message data.

13. The wireless communication transmission device of claim 12, wherein the processor is further programmed to omit using a DC-level symbol in the Stop Waveform, thereby making the Stop Waveform orthogonal, and therefore impervious, to DC offsets.

14. A method in a wireless communication device for facilitating a termination of reception of a received signal simultaneously with an end of a transmission on a channel, the method comprising:

receiving the received signal corresponding to a known Stop Waveform comprising a predetermined symbol pattern on the channel;

computing a plurality of characteristics derived from the received signal, including:

a carrier-to-noise ratio;

a maximum normalized symbol correlation energy over all symbols of the Stop Waveform; and

a number of small and a number of large normalized symbol energy values;

detecting the Stop Waveform by comparing the plurality of characteristics with a corresponding plurality of predetermined thresholds; and

terminating the reception of the channel in response to detecting the Stop Waveform.

15. The method of claim 14,

wherein the known Stop Waveform is modulated as an M-ary frequency-shift-keyed (FSK) signal; and

wherein the computing the carrier-to-noise ratio further comprises computing the carrier-to-noise ratio by breaking down a waveform correlation between the received signal and the known Stop Waveform into symbol-level correlations, based on the predetermined symbol pattern with expected symbol deviation frequencies, at different timing offsets.

16. The method of claim 15, further comprising;

computing the carrier-to-noise ratio by, for each of the different timing offsets, phase-correcting said symbol-level correlations according to a known modulation index and the predetermined symbol pattern, thereby producing a plurality of phase-corrected symbol-level correlation sequences.

17. The method of claim 16, further comprising;

computing the carrier-to-noise ratio by, for each timing offset, computing a Fourier transform magnitude-squared of the plurality of phase-corrected symbol-level correlation sequences.

18. The method of claim 17, further comprising;

computing the carrier-to-noise ratio by, for each timing offset, performing a frequency search, over a predetermined range, for a maximum energy peak in the Fourier transform, corresponding to the timing offset.

19. The method of claim 18, further comprising;

computing the carrier-to-noise ratio by, for each timing offset, computing the carrier power, by summing up the Fourier transform magnitude-squared over multiple bins, centered about a frequency bin where the maximum energy peak has occurred.

20. The method of claim 19, further comprising: computing the carrier-to-noise ratio by;

determining an optimum timing offset based on a maximum carrier power;

computing a noise power by summing the Fourier transform magnitude-squared, corresponding to the optimum timing offset, over all remaining bins that were not used for computing the carrier power;

computing said maximum normalized symbol correlation energy over all symbols of the Stop Waveform by forming a normalized symbol correlation energy sequence, by taking a magnitude-squared of each of the symbol-level correlations, for each symbol interval, corresponding to said optimum timing offset, and dividing by a received signal power over the same symbol interval, where the denominator term uses a timing offset corresponding to a nominal symbol timing; and

computing said number of small and said number of large normalized symbol energy values over all symbols of the Stop Waveform, wherein a normalized symbol correlation energy value is said to be small if it is less than said maximum normalized symbol correlation energy scaled by a first predetermined value that is less than unity, and wherein the normalized symbol correlation energy value is said to be large if it is greater than said maximum normalized symbol correlation energy scaled by a second predetermined value that is less than unity.